Lead Remediation Symposium

Literature Review:

Efficacy of Lead Abatement Strategies in the Reduction of Blood Lead Concentrations in Children

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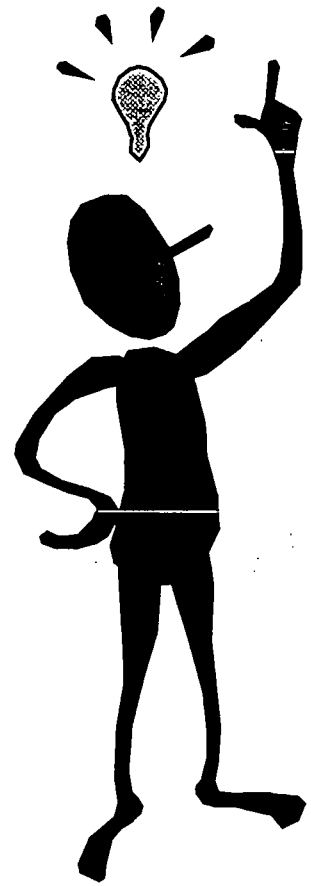
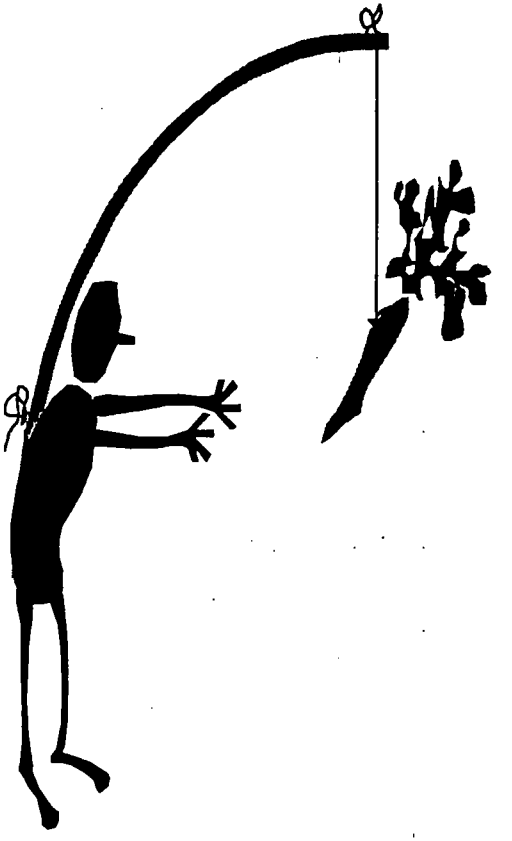
Introduction

- U.S. EPA contract work sponsored by Superfund program
- Facts:
  - Several exposure pathways for lead (multimedia)
  - Several abatement methods are available, and all have been reported to be effective



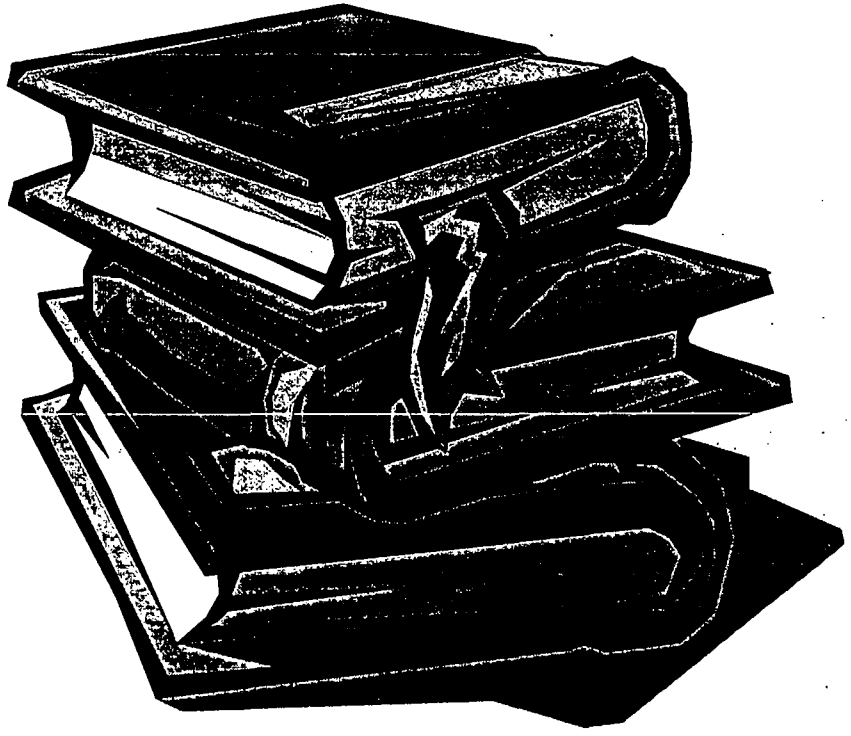
Question

- Abatement of which media or combination of methods had most impact on blood lead concentrations in children?



Methods

- Literature review using National Library of Medicine databases
- Searches were conducted between 7/97–8/99
- No original data were collected

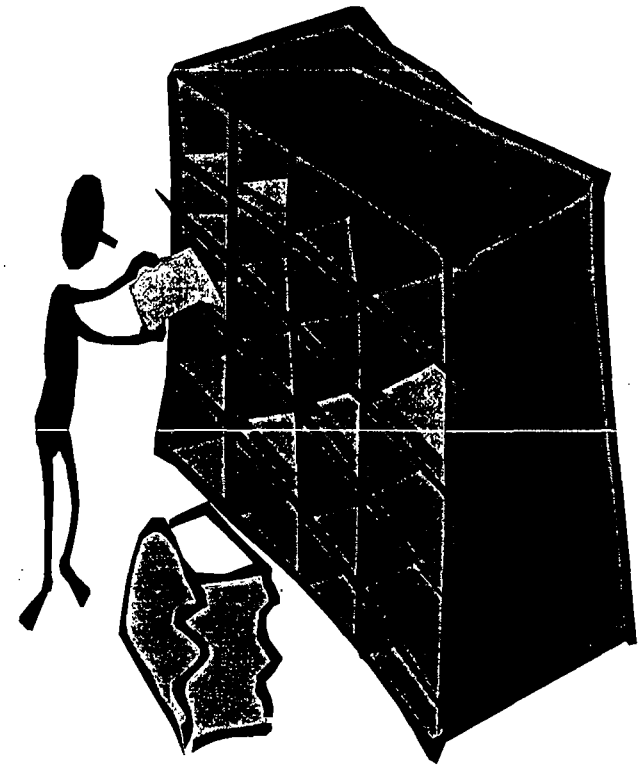


Inclusion Criterion

- Results must be reported in terms of quantitative blood lead concentration in children before and after abatement.

Articles Retrieved

- 19 reports satisfied the inclusion criteria
- These can be classified by primary abatement method
  - Soil (8)
  - Dust (4)
  - Paint (5)
  - Education (2)



Assessment

- Impact was assessed as the percent change in the blood lead concentration of children between pre- and post- abatement.

Confounding Variables

- Seasonality, age, SES, education, nutrition, dose-response variability, long-term reductions of lead in the environment
- Discriminating effect of one method when several were used

Soil Abatement

Study	Decrease in blood lead in µg/dL (time frame)
Boston Three-City: Phase I	Study group: 22% (0-6 months); 19% (6+ months) **13.1–10.19–10.65** Group A: 29% (0-6 months); 7% (6+ months) **12.37–8.85–11.49** Group B: 18% (0-6 months); 6% (6+ months) **12.02–9.83–11.35**
Boston Three City: Phase II	Study group: 22% (0-6 months); 19% (6+ months) **13.1–10.19–10.65** Group A: 29% (0-6 months); 7% (6+ months) **12.37–8.85–11.49** Group B: 18% (0-6 months); 6% (6+ months) **12.02–9.83–11.35**
Baltimore Three City	Control group: 23% decrease **10.9–8.4** Treatment group: 20% decrease **12.1–9.7**
Port Pirie	26% (6+ years) **19.3–14.2**
Toronto Soil & Dust	SR group: 34%, 54%, 54%, and 74% (4, 5, 6, and 8 years, respectively) **14–9.3–6.5–6.4–3.9** OBLS group: 57%, 70%, and 71% (4, 5, and 8 years, respectively) **11.9–5.1–3.6–3.5**
St. Jean-sur-Richelieu	Children aged 6 months - 10 years: 48% (2 years) **9.7–5.0** Children aged 6 months - 5 years: 44% (2 years) **9.8–5.5**
Rouyn-Noranda	1991 group: 27% (2 years) **10.0–7.3**
Bunker Hill	47% (6+ years) **8.5–4.5**

Dust Abatement

Study	Decrease in blood lead in µg/dL (time frame)
Baltimore Dust Control	Control: no change **38.5–38.5–38.5** Experimental: 14% (6 months);18% (6+ months) **38.6–33.3–31.7**
Trail, British Columbia	Control: 8% (10 months) **11.9-–11.1** Case: 5% (10 months) **11.3–10.7**
Rochester Randomized: 1996	Control: increase by 6% **6.8–7.22** Intervention: 7% **6.6–6.13**
Rochester Randomized: 1999	Control: increase by 160% **2.9–7.8** Intervention: increase by 160% **2.8–7.3**

Paint Abatement

Study	Decrease in blood lead in µg/dL (time frame)
St. Louis Retrospective	Control: 12% (6+ months) **35.1–30.9** Case: 23% (6+ months) **34.9–26.7**
Central Massachusetts Retrospective	18% (1 year) **26.0–21.2**
Boston Retrospective	8% (0-6 months) **36.4–33.5**

Education

Study	Decrease in blood lead in µg/dL (time frame)
Granite City Education	48% (0-6 months); 40% (1 year) **15–7.8–9.0**
Milwaukee Retrospective Education	Reference group: 6% **21.2–20** Study group: 21% **20.0–15.8**

Conclusions

- In general, lead abatement is effective in reducing blood lead concentrations in children
- Use of 2 or more methods was usually more effective than use of one method
- The greatest effect was most evident in children with high initial blood lead concentrations